

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION I
OFFICE OF SITE REMEDIATION AND RESTORATION**

**KEEFE ENVIRONMENTAL SERVICES
FIVE YEAR REVIEW**

September 1997

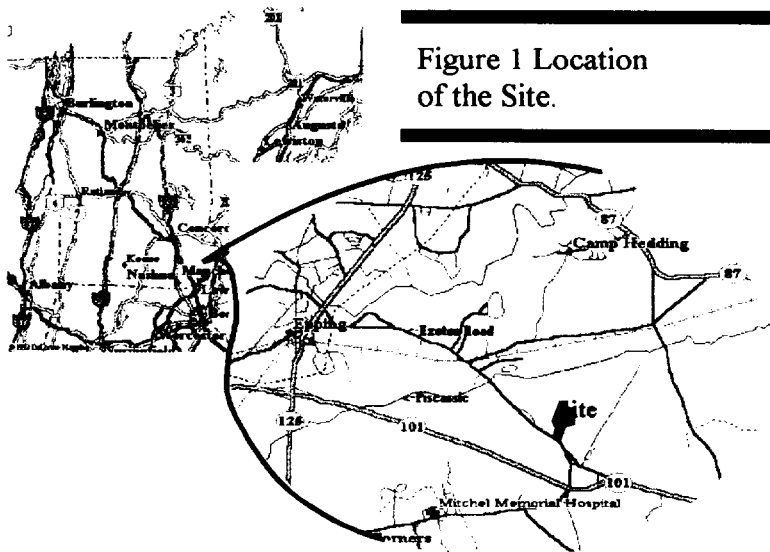
I. INTRODUCTION

A. Authority, Purpose.

EPA Region I conducted this review pursuant to CERCLA Section 121(c), the National Contingency Plan Section 300.400(f)(4)(ii), and OSWER Directives 9355.7-02 (May 23, 1991) and 9355.7-02A (July 26, 1994). This Review is a Statutory Review. The purpose of a five-year review is to ensure that a remedial action remains protective of public health and the environment and is functioning as designed. This document will become a part of the Site File. Because construction has been completed at the Site and only long-term response remains, this is a Type I review. Congress proposed listing of the Site on the National Priorities List on October 23, 1981 and finalized the listing on September 8, 1983.

B. Site Characteristics.

The Keefe Environmental Services Site (the "Site") is located in Rockingham County, Epping, New Hampshire.



The operators of the seven-acre facility operated a chemical waste storage facility from 1978 until declaring bankruptcy in 1981. Waste storage containers abandoned at the Site by the operator, and removed by EPA, included 4,100 drums, four 5,000-gallon and four 10,000-gallon aboveground storage tanks, and a 700,000-gallon synthetically-lined lagoon. Solvents, acids, caustics, heavy metals, paint sludges,

waste oils, and organic chemicals were disposed of at the Site. Soil and ground water on- and

off-site have been contaminated. The Site is located in a State-protected watershed with wetland areas draining to the Piscassic River. The Site is located in a semi-rural area. There are approximately 12 houses, with a population of 30 people located along Exeter Road, south of the Site. The ground water aquifer is used as a drinking water source for the twelve residences; however, the ground water is tested by the State on an annual basis and no residential well has shown contamination. Ground water is the major source of drinking water for approximately 2,000 people within a 3-mile radius of the Site. The Town of Newmarket has a water supply intake on the Piscassic River, 7 miles downstream from the Site.

Following discovery, EPA declared an emergency in 1981 when EPA determined that the 700,000-gallon waste lagoon was about to overflow. The EPA and State removed and treated the liquid wastes in the lagoon to reduced the level in the lagoon and lessen the threat of a spill. In 1983 through 1984 the EPA and State removed all of the waste and containers, including the waste in the lagoon, and disposed of the contaminated material, as well as highly contaminated soil adjacent to the lagoon, at a regulated facility.

C. Present Status of the Site

The State has operated a ground water extraction and treatment facility at the Site since 1992. The facility lies on the northern end of a small drumlin. Contaminated ground water flows northward from the Site in the shallow, sandy portion of the aquifer shown in the cross-section on Figure 2. Ground water is collected from four extraction wells and a collection trench. Extraction has been discontinued from two of the wells because the areas they occupy have reached ground water cleanup goals. In 1992 the State lined the former 700,000-gallon waste lagoon, placed some contaminated soils from the extraction trench in it, percolated treated water through the pile to remove contaminants, and routed the drain to the treatment plant to treat the leached, contaminated water. The extraction system treats an average of 20 gallons per minute of contaminated ground water. The treatment plant removes metals through precipitation and volatile organic compounds through air stripping. The metals are recovered as a sludge, drummed, and shipped off-site for disposal. Past testing of the sludge has shown it to be non-hazardous. The volatile organic compounds are captured from the resultant air stream from the air stripper on activated carbon. The activated carbon is shipped off-site for incineration and regeneration of the carbon. The ground water extraction and treatment is expected to continue until at least 1999.

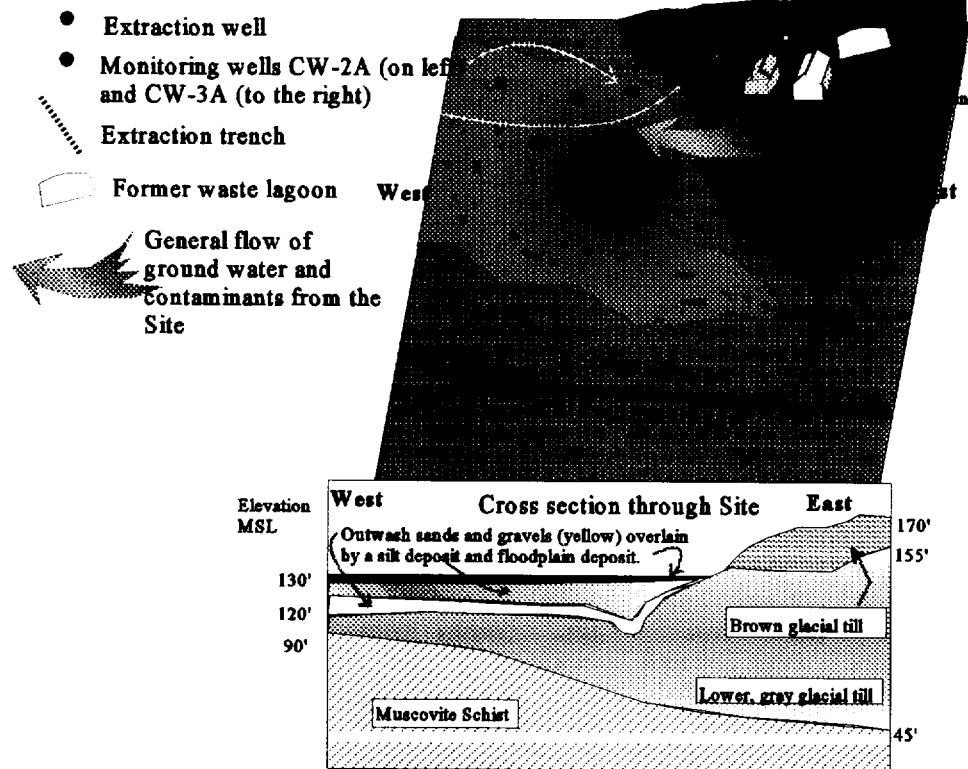
Institutional controls were not called for in the 1988 ROD. Nor were any provisions made for alternate water supply sources for the nearby residents. EPA and the State did not believe that institutional controls were necessary due to two factors:

1. although some contamination had been detected in residential wells in early 1979, no contamination has been detected during annual sampling conducted since that time; and

2. ground water contamination migration appears to have been halted onsite, continued pump-and-treat operations will further diminish the contaminant plume.

Although no surface hazards exist, site security is maintained by a six-foot high chain-link fence which surrounds the Site.

Figure 2. The top portion of the figure contains a plan view of the site (in green) that shows the treatment plant (in white) an abandoned building (in gray) and the flow of contaminated ground water towards the wetlands where it is intercepted, extracted, and sent to the treatment plant. Below the plan view is a cross-section through the Site to show the underlying geology. The upper-most of the photographs below was taken in 1984, most likely from a position west of the treatment plant and looking eastward. The bottom picture was taken from a position northwest of well CW-3A, looking southeast and includes the ground water treatment plant.



Drum staging at the Site in 1984.

The ground water treatment plant in 1997, most likely the same area in the 1984 photo above.



II. REMEDIAL OBJECTIVES

A. Remedial Objectives Set in the 1988 Record of Decision

EPA issued a Record of Decision (ROD) on March 21, 1988, for the final cleanup of the Site. The Site cleanup consisted of a Source Control Component and a Management of Migration Component.

The Remedial Response Objectives in the 1988 ROD for the source control component consisted of:

- prevent or mitigate the further release of contaminants to surrounding environmental media;
- eliminate or minimize the threat posed to public health, welfare and the environment from the source area; and
- reduce the volume, toxicity or mobility of hazardous substances, pollutants and contaminants.

The EPA selected the first objective to halt the migration of contaminants from a suspected source area near the center of the Site. The second objective was concerned with addressing exposure pathways and risks associated with dermal contact with contaminated soils, inhalation of contaminated dust and vapors, and ingestion of contaminated soil. The above two objectives resulted in the following cleanup goals:

SOIL CLEANUP GOALS	
CONTAMINANT	CLEANUP LEVEL (Parts per billion)
BENZENE	20.8
TETRACHLOROETHYLENE	91.0
TRICHLOROETHYLENE	31.5
1,2 DICHLOROETHANE	3.5
1,1 DICHLOROETHYLENE	22.8

The third objective prompted the EPA to select vacuum extraction to remove contaminants from an area that was estimated to encompass approximately 150,000 square feet and three to ten feet in depth, near the center of the Site. However, Pre-Remedial Design investigations indicated that vacuum extraction would be unnecessary since soil concentrations

were below soil cleanup levels established in the ROD. Natural attenuation and migration into the water table that had occurred since the initial investigations had significantly reduced the concentration of contaminants in soil. Therefore, EPA issued an Explanation of Significant Differences on June 8, 1990, deleting the requirement to construct a vacuum extraction system.

The Remedial Response Objectives in the 1988 ROD for the management of migration component consisted of:

- preventing or mitigating migration of contaminants beyond their current extent; and
- eliminating or minimizing the threat posed to the public health, welfare and environment from the current extent of contaminant migration.

Cleanup goals for the ground water, developed in response to the second objective include:

GROUND WATER CLEANUP GOALS	
CONTAMINANT	CLEANUP LEVEL (Parts per billion)
BENZENE	5
TETRACHLOROETHYLENE	5
TRICHLOROETHYLENE	5
1,2 DICHLOROETHANE	5
1,1 DICHLOROETHYLENE	7

The remedy selected to meet both objectives consisted of extracting ground water from the aquifer, treating it on-site using air stripping, filtration and carbon absorption, and then disposing the treated water by recharging it to the aquifer. On April 20, 1993, EPA determined that the ground water cleanup construction was complete as described in the ROD and Dennis Huebner, the EPA Branch Chief, signed the Final Closeout Report on September 30, 1993.

B. Attainment of Objectives

As stated above, Pre-Design Investigations demonstrated that the objectives for the source control component were met prior to any action at the Site. All constructed components of the management of migration remedy were completed in 1993. The attainment of the objectives set forth for management of migration are best shown through a comparison of the concentrations of contaminants found in representative ground water monitoring wells at the Site:

GROUND WATER CLEANUP PROGRESS				
This table sums the concentrations of the contaminants shown in the preceding table titled "Ground Water Cleanup Goals" found in each well and compares the results from 1986 to those found in 1996.				
Sum of compounds (benzene; tetrachloroethylene; trichloroethylene, 1,2 dichloroethane; 1,1 dichloroethylene; found in each well.	CW-3A (historically the most contaminated) (in parts per billion)		CW-2A (northern ground water flow path) (in parts per billion)	
	1986	1996	1986	1996
TOTAL VOLATILE ORGANIC COMPOUNDS	11,777	614	2,483	3.5

The ground water treatment plant has been operated by the State continually since 1993. Pumping at a rate of approximately 20 gallons per minute, the plant has extracted, treated, and re-injected 50 million gallons of water and removed at least 120 pounds of contaminants from the aquifer. The extraction and treatment of ground water has reduced the mobility of the contaminants, halting their migration, and thereby protecting human health and the environment.

III. ARARs REVIEW

Since the 1988 ROD was signed there have been no changes in the regulatory standards for any of the compounds with identified cleanup levels. Nor have any State or Federal laws been enacted which may call into question the protectiveness of the remedy. The State has updated or enacted the following Regulations since the 1988 ROD was signed:

Water Quality Standards, Env-Ws 310-319, 1994. Sets drinking water standards, no change from Federal Standards in existence, and evaluated in the ROD, in 1988.

Groundwater Protection Rules, Env-Ws 410, February 1993. The State's ground water anti-degradation rules. This regulation serves primarily as a permitting mechanism that aims to halt the migration of contaminants, reduce the potential for exposure through institutional controls, and track the ground water contaminant plume migration. No standards are set that call into question the protectiveness of the remedy at the Site.

Surface Water Quality Regulations, Env-Ws 430-438, July 1996. Maintains the ambient water quality criteria contained in the Federal regulations in existence, and evaluated in the

ROD, in 1988. Does provide for qualitative standards for surface water and sediments; however, surface water contamination has not occurred at the Site.

Hazardous Waste Rules, Env-Wm 100-1003, August 1994. Maintains the general criteria that the RCRA regulations contained, and evaluated for the ROD, in 1988. Applies to the operation of the facility and the maintenance of the equipment. A review of the regulations and an inspection of the Site revealed no violations.

Rules Governing the Control of Air Pollution, Env-A 100-1700, December 1995. Would apply to the air stripper. Emissions from the air stripper unit lie well within the standards provided in these regulations.

In summary, after review by the State and EPA no new regulations nor standards indicate that the remedy at the Site is not protective of public health and the environment.

IV. SUMMARY OF SITE VISIT

The EPA Site manager, Darryl Luce, conducted a Site inspection on April 24, 1997. Present were Harvey King, the treatment plant operator and Thomas Andrews, the State's Project Manager. The inspection revealed that no additional residences have been built in the area which may place a well into a contaminated portion of the aquifer. The inspection also verified that operation of the treatment plant is continuing and that progress in the cleanup is occurring.

V. AREAS OF NONCOMPLIANCE

None.

VI. RECOMMENDATIONS

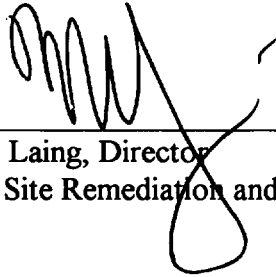
Based on monitoring results and conditions at the Site, the State should continue to operate the ground water extraction and treatment plant and should continue the current ground water monitoring schedule.

VII. STATEMENT OF PROTECTIVENESS

I certify that the remedy selected for this Site remains protective of human health and the environment.

VIII. NEXT REVIEW

The next five-year review will be conducted by September 30, 2002 unless the ground water remedy has reached final ground water cleanup levels and reduced residual human health risk to within EPA's acceptable risk range and the Site is protective of human health and the environment and likely to remain so under an unlimited use and unrestricted exposure scenario.



Harley F. Laing, Director
Office of Site Remediation and Restoration, Region I